

Work Order ID 130381

Thursday, September 03, 2015 8:26:03 AM

130381

Page 1

Item ID: D407-667-205 Accept ***N900040100*** Setup Start ***NS1***
Revision ID: Stop ***NS2***
Item Name: Aft Crosstube - High 407
Start Date: 3/10/2015 Start Qty: 1.00 ***1*** Cust Item ID:
Required Date: 3/10/2015 Req'd Qty: 1.00 ***1*** Customer:
Reference:

Approvals: Process Plan: MCS Date: SEP 03 2015 Tooling: _____ Date: _____ Run Start ***NR1***
QC: _____ Date: _____ SPC (Y/N): _____ Date: _____ Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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Draw Nbr	Revision Nbr
D407-667-245	G

100	Document Control	0.00							
100	DOCUMENT CONTROL								
DC	Memo	0.00							
Doc.Control -USB or Paperwork	Photocopy bluefile and create labels as per PPP D407-667-205 CHG000								

110	Pick Kit	0.00							
110	Packaging								
Packaging	Memo	0.00							
Packaging									

120	BENDING MACHINE - CROSSTUBES	0.00							
120									
CNC Bend 1	Memo	0.00							
CNC Delta 100 Bender	1-Bend tube as per Dwg D407-667-245 using CNC bender program 407 Aft and Folio 21								

SCRAP

BC 15/09/22

JW 15-09-22

130381

Thursday, September 03, 2015 8:26:03 AM

N900040100

Setup Start *NS1*

Stop *NS2*

*** 1 ***

Cust Item ID:

Start Date: 3/10/2015 **Start Qty:** 1.00

*** 1 ***

Customer:

Required Date: 3/10/2015 **Req'd Qty:** 1.00

Reference:

Run Start *NR1*

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____

Stop *NR2*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
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130

QC15- Crosstube Dimensional Check

0.00

130

0,00

OC

Memo

Quality Control

Work Order ID 130381

Thursday, September 03, 2015 8:26:03 AM

130381

Page 3

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Stop ***NS2***

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Start Date: 3/10/2015 Start Qty: 1.00

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Cust Item ID:

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Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

140

0.00

140

Crosstubes

0.00

Crosstubes

Memo***** ENSURE PROPER JIG POSITIONING BEFORE DRILLING***** ,
VERIFIED BY: _____ *****

1-Drill pilot holes in tube using drill Jig DT8583 & DT8584 as per Dwg D407-667-245. Drill all (3) top holes. Holes facing inboard. Drill and Ream all holes in tube to finish size using drill Jig DT8583 & DT8584 as per Dwg D407-667-245

***** ENSURE PROPER JIG POSITIONING BEFORE DRILLING***** ,
VERIFIED BY: _____ *****2- Drill fwd rivet holes using drill Jig DT8787 fwd as per Dwg D407-667-245.
Note: FWD side has 3X top holes facing inboard.

3- C'sink holes as per dwg D407-667-245. Allow rivet to sit below surface to compensate for paint.

4- Flip tube and switch drilling Jigs from right to left, left to right. Locate Jigs off existing holes using "T" pins. Drill ONLY 2 top holes ONLY plug most bottom hole to prevent accidental drilling. Drill holes and ream using drill Jig DT8583 & DT8584 as per Dwg D407-667-245. Drill only the top (2) holes. Drill & ream the top (2) holes to finish size using drill Jig DT8583 & DT8584 as per Dwg D407-667-245

***** ENSURE PROPER JIG POSITIONING BEFORE DRILLING***** ,
VERIFIED BY: _____ *****

5-Drill aft rivet holes using drill Jig DT8787 aft as per Dwg D407-667-245.

Work Order ID 130381***130381***

Page 4

Thursday, September 03, 2015 8:26:03 AM

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Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

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Drill only the top (2) holes.

***** ENSURE PROPER JIG POSITIONING BEFORE DRILLING***** ,
VERIFIED BY: _____ *****6- C'sink holes as per dwg D407-667-245. Allow rivet to sit below surface to
compensate for paint.

7- Scribe tube to identify on the inner chamfer in the cuff D# and B#

8-*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***Debur
& Inspect for surface damage. Repair damage within limits as per Dwg D407-
667-245

150

0.00

150

HandFXtube

Memo

0.00

Hand Finishing Crosstubes

IMMEDIATELY AFTER GRINDING

1- PRESSURE WASH X-TUBE INSIDE AND OUT

2- ALODINE AND ACID ETCH X-TUBE INSIDE AND OUT AS PER QSI005.

Thursday, September 03, 2015 8:26:03 AM

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Approvals: _____ **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____

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Stop ***NR2***

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--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

160

QC7-Inspect Chemical Conversion Coat

0.00

160

QC

Memo

0.00

Quality Control

170

QC5- Inspect part completeness to step on W/O

0.00

170

QC

Memo

0.00

Quality Control

180

Outsource process - NDT per QSI038 4.1

0.00

180

Outsource2

Memo

0.00

Outsource process - NDT

*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE ***

Liquid Penetrant Inspection as per QSI 0380

Issue P/O: LPI as per ASTM 1417

Level 2 Attach copy of NDT results to work order

Work Order ID 130381***130381***

Page 7

Thursday, September 03, 2015 8:26:03 AM

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Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

210

0.00

210

SprayPaint

SprayPaint

Memo

0.00

Spray Painting

*** WEAR LATEX GLOVES WHEN HANDLING CROSSTUBE***

1-Prime inside and outside crosstube as per DEO D407-667-245 and QSI 005 4.2

PRIME:

Start Time: _____

Finish Time: _____

Mask underside of crosstube as shown

2-Paint outside crosstube with White Imron as per QSI 005 4.2

PAINT:

Start Time: _____

Finish Time: _____

3- Apply clear coat as per dwg

Clear Coat Batch: _____

Work Order ID 130381***130381***

Page 8

Thursday, September 03, 2015 8:26:03 AM

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Work Center ID****Operation
Description****Set Up/
Run Hours****Tool ID****Tool #****Plan
Code****Accept
Qty****Reject
Qty****Reject
Number****Insp.
Stamp**

220

QC14- Inspect Spray Paint

0.00

220

QC

Memo

0.00

Quality Control

Then, Wrap in plastic bag to protect from scratches

Work Order ID 130381***130381***

Page 9

Thursday, September 03, 2015 8:26:03 AM

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Start Date: 3/10/2015 Start Qty: 1.00

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Cust Item ID:

Required Date: 3/10/2015 Req'd Qty: 1.00

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Customer:

Reference:

Approvals: Process Plan: _____ Date: _____ Tooling: _____ Date: _____

Run Start ***NR1***

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

230

230

Crosstubes

Crosstubes

0.00

Memo

0.00

Crosstubes

1- Install chafing shield as per D407-667-245 using DT10096 to establish 8.90
dimension. Top holes should be facing up.

****Ensure chaffing is to be position "overlap" AFT****

A/R Proseal 890 Batch: _____

EXP: _____

2- Lightly scuff the bonded area using a 320 grit sand paper and clean the area
with 41058 wash 'n' wipe3- Install support with Scotch-Weld DP460 and install clamps as per Dwg D407-
667-245 using installation jig DT9025. Torque clamps as per dwg

A/R Scotch-Weld DP460 Batch: _____

EXP: _____

LET CURE FOR 24 HOURS

CURE TIME:

START: _____

FINISH: _____

4- Install nut plates as per Dwg D407-667-245. Touch-up rivet heads with Imron
paint.

130381

Thursday, September 03, 2015 8:26:03 AM

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Setup Start *NS1*

Stop ***NS2***

1

*** 1 ***

Start Date: 3/10/2015 **Start Qty:** 1.00

Required Date: 3/10/2015 **Req'd Qty:** 1.00

Run Start *NR1*

Stop *NR2*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

240

QC5- Inspect part completeness to step on W/O

0.00

240

QC

Memo

0.00

Quality Control

RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVE HAS CURE FOR 24HOURS AS PER DWG DEO

250

Pick Kit

0.00

250

Packaging

Memo

0.00

Packaging

260

QC4- 100% Inspect kits for completeness

0.00

260

QC

Memo

0.00

Quality Control

Thursday, September 03, 2015 8:26:03 AM

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Setup Start *NS1*

Revision ID:

Item Name: Aft Crosstube - High 407

Stop *NS2*

Start Date: 3/10/2015 **Start Qty:** 1.00

*** 1 ***

Cust Item ID:

Required Date: 3/10/2015 Req'd Qty: 1.00

*** 1 ***

Customer:

Reference:

Approvals: **Process Plan:** _____ **Date:** _____ **Tooling:** _____ **Date:** _____

Run Start *NR1*

QC: _____ Date: _____ SPC (Y/N): _____ Date: _____

Stop ***NR2***

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
--------------------------------	--------------------------	----------------------	---------	--------	--------------	---------------	---------------	------------------	----------------

270

0.00

270

Packaging

0.00

Packaging

Memo

Packaging

Identify and in kanban rack
Location : FG097

280

QC21- Final Inspection - Work Order Release

0.00

280

0.00

QC

Memo

Quality Control

MF
15-10-9

Picklist Print

Page 1

Thursday, September 03, 2015 8:26:07 AM

Work Order ID: 130381

130381

Parent Item: D407-667-205

D407-667-205

Parent Item Name: Aft Crosstube - High 407

Start Date: 3/10/2015

Required Date: 3/10/2015

Start Qty: 1.00

Required Qty: 1.00

Comments: IPP Rev:C 05.09.02 Add holes for compatibility with Bell SkidtubesKJ/JLM
IPP Rev:D Added Magnobond,Rubber Cushion & Clamps 07-02-19
JLM

****CHANGE TO CHG 005 - IF USING D2894-1 B35578 OR GREATER****

IPP Rev:E 08-05-22 add comment in seq. 6 and QC15 and QC5 DD verified
by:EC

IPP Rev:F 08-06-12 add comment in seq. 24 DD verified by:EC

IPP Rev:G 08-08-19 revE as per dwg DD verified by:EC

IPP Rev H 09.01.06 ECN 08-562 EC verified by:DD IPP Rev:I

10.04.07 revise route seq. in bom DD verified by:JLM IPP Rev J 11.04.26

removed abrasion strip ecn 11-551 EC verified

by:DD

IPP REV:K

11.10.03 DEO D407-667-245-F-2 DD verf:EC

Component Item ID/ Item Name	Replacement Item ID	Mfg/ Purch	Bin Item	Primary Location	Last Location	Route Seq ID	Unit of Measure	Qty on Hand	Qty per Kit	Total Qty	Qty Issued	Date Issued	Status
D407-667-205TRN		Manufactured	No			110	Each	8.0000	1	1			

D407-667-205TRN

**

15/09/22 BC

Crosstube Turning Detail

Location	Loc Qty	Loc Code
LG014	8	
132869	1	
132873	1	
133034	1	
133037	1	
133040	1	
133041	1	
133042	1	
133043	1	

Picklist Print

Thursday, September 03, 2015 8:26:07 AM

Page 2

Work Order ID: 130381

130381

Parent Item: D407-667-205

D407-667-205

Parent Item Name: Aft Crosstube - High 407

Start Date: 3/10/2015

Required Date: 3/10/2015

Start Qty: 1.00

Required Qty: 1.00

D2873-043	Manufactured	No	230	Each	59.0000	2	2
D2873-043						**	
Nut Plate Assembly							

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
LG050	59	
133401	59	

D2873-045	Manufactured	No	230	Each	33.0000	2	2
D2873-045						**	
Nut Plate Assembly							

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
LG050	20	
134433	20	
LG052	13	
132618	13	

D2894-1	Manufactured	No	230	Each	7.0000	1	1
D2894-1						**	
2.75 Support							

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
LG052	7	
131841	1	
132591	6	

D3190-1	Manufactured	No	230	Each	11.0000	2	2
D3190-1						**	
Chaffing Shield							

<u>Location</u>	<u>Loc Qty</u>	<u>Loc Code</u>
LG053	11	
132174	5	
133120	6	

Picklist Print

Thursday, September 03, 2015 8:26:08 AM

Work Order ID: 130381

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Parent Item: D407-667-205

D407-667-205

Parent Item Name: Aft Crosstube - High 407

Start Date: 3/10/2015

Required Date: 3/10/2015

Start Qty: 1.00

Required Qty: 1.00

D3595-063-450

Manufactured No

230

Each

75.0000

2

2

D3595-063-450

Rubber Cushion 0.63" wide x 4.50" Long

Location

Loc Qty

Loc Code

FG

22

129907

10

131013

6

88422

6

LG051

53

135019

53

MS20601-AD4W8

Purchased

No

230

Each

417.0000

14

14

MS20601-AD4W8

RIVET

Location

Loc Qty

Loc Code

CCK003

200

M133031

200

LG051

17

M132256

17

ST308

200

M132107

200

MS21920-22

Purchased

No

230

Each

104.0000

4

4

MS21920-22

Clamp

Location

Loc Qty

Loc Code

LG050

104

M128636

3

M130822

2

M132045

4

M132275

4

M132550

41

M132854

50

Picklist Print

Thursday, September 03, 2015 8:26:08 AM

Page 4

Work Order ID: 130381

130381

Parent Item: D407-667-205

D407-667-205

Parent Item Name: Aft Crosstube - High 407

Start Date: 3/10/2015

Required Date: 3/10/2015

Start Qty: 1.00

Required Qty: 1.00

MS21920-25

Purchased

No

230

Each

146.0000

2

2

MS21920-25

Clamp

Location

Loc Qty

Loc Code

FG	10	
120920	10	
LG050	64	
M130400	10	
M131367	3	
M132169	11	
M133091	40	
LG057	72	
M132674	40	
M132675	32	

NAS1149D0563J

Purchased

No

230

Each

1,005.000

18

18

NAS1149D0563.J

Washer

Location

Loc Qty

Loc Code

GA	53	
m125807	53	
ST260a	777	
m130799	63	
m132035	55	
m132256	59	
m132677	600	
ST269	156	
m128257	156	
ST271	19	
m131026	19	

Picklist Print

Thursday, September 03, 2015 8:26:08 AM

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D407-667-205

Parent Item Name: Aft Crosstube - High 407

Start Date: 3/10/2015

Required Date: 3/10/2015

Start Qty: 1.00

Required Qty: 1.00

AN5-10A	Purchased	No	250	Each	201.0000	10	10
---------	-----------	----	-----	------	----------	----	----

AN5-10A******

BOLT

Location	Loc Qty	Loc Code
GA	51	
122800	51	
ST338	150	
m133077	150	

AN5-32A	Purchased	No	250	Each	169.0000	4	4
---------	-----------	----	-----	------	----------	---	---

AN5-32A******

Bolt

Location	Loc Qty	Loc Code
ST299A	130	
m132536	100	
m132857	30	
ST337	39	
m131139	39	

AN5-34A	Purchased	No	250	Each	62.0000	4	4
---------	-----------	----	-----	------	---------	---	---

AN5-34A******

Bolt

Location	Loc Qty	Loc Code
ST299A	50	
m132857	25	
m133077	25	
ST336	12	
m128634	2	
m132551	10	

Picklist Print

Page 6

Thursday, September 03, 2015 8:26:09 AM

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D407-667-205

Parent Item Name: Aft Crosstube - High 407

Start Date: 3/10/2015

Required Date: 3/10/2015

Start Qty: 1.00

Required Qty: 1.00

MS21042L5

Purchased

No

250

Each

539.0000

4

4

MS21042L5

Nut

Location

Loc Qty

Loc Code

GA

146

m127813

146

ST260a

345

m132677

345

ST305

48

m127813

19

m131340

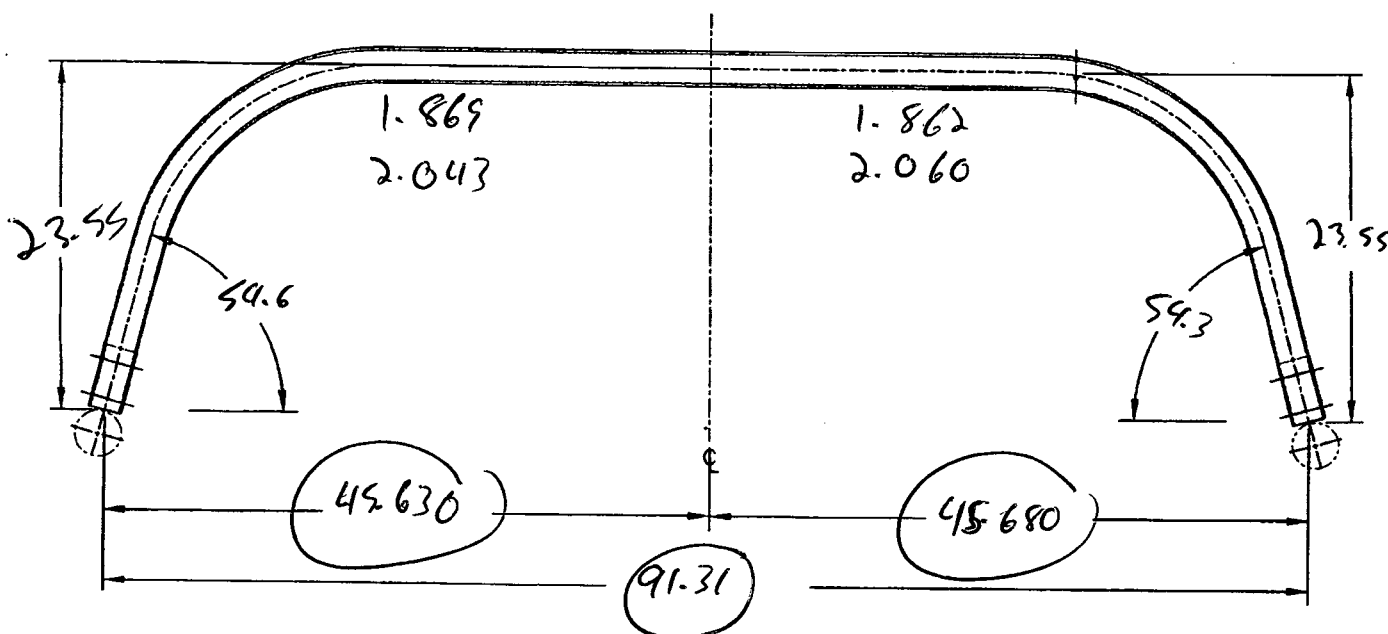
21

m132123

8

DART AEROSPACE LTD		Work Order:	130381
Description: Crosstube High Aft (407)		Part Number:	D407-667-205
Inspection Dwg: D407-667-245	Rev: G	Page 1 of 1	

Required Dimension	Min	Max
Height	23.39	23.65
1/2 Span	45.79	46.05
Angle	54	56
Total Span	91.58	92.100
Bending Passes	6	--
Crushing	--	6%



	Side A	Side B
Bending Passes	27	27
Crushing	4.4%	5.0%
Comments		

QC15 Inspection	
Date	

Rev	Date	Change	Revised by	Approved
A	07.02.06	New Issue	KJ/JM	
B	09.06.22	Dwg Rev updated	KJ	
C	11.08.22	Dimensions updated	KJ	
D	11.09.30	Dimensions updated	KJ	
E	12.04.16	Added bending, crushing dimensions	KJ	
F	15.05.14	Dwg Rev updated	KJ	

Item	QTY	PART NUMBER	DESCRIPTION
	-245		
	X	D407-667-245	CROSSTUBE ASSEMBLY (407 HIGH AFT)
1	1	D6011-115	CROSSTUBE
2	2	D2873-043	NUT PLATE
3	2	D2873-045	NUT PLATE
4	1	D2894-1	SUPPORT
5	2	D3190-1	CHAFING SHIELD
6	2	D3595-063-430	RUBBER CUSHION
7	14	MS20601AD4W8	RIVET (OR NAS9302B-4-8)
8	4	MS21920-22	CLAMP
9	2	MS21920-25	CLAMP (OR MS21920-24)
10	AR	SCOTCH-WELD DP460	EPOXY ADHESIVE, 3M SCOTCH-WELD
11	AR	PROSEAL 890	SEALANT

GENERAL NOTES:

- 1) MATERIAL: MANUFACTURED FROM D6011-115
FINISHED LENGTH = 112.91±0.020
- 2) FINISH: CHEMICAL CONVERSION COAT PER DART QSI 005 4.1
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2
PAINT CROSSTUBE PER DART QSI 005 4.2
FOR HATCHED AREAS (ZN A6-2), MASK AS REQUIRED
TO APPLY PRIME AND APPLY CLEAR COAT ONLY
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D407-667-245" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 27.7 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE.
- 9) RUN-OFF PART. BLEND OUT EDGE LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 6 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) LIQUID PENETRANT INSPECT OUTSIDE SURFACE OF CROSSTUBE PER QSI 038.
- 12) INSTALL D2894-1 CENTER SUPPORT USING A 0.04" TO 0.07" THICK LAYER OF SCOTCH-WELD DP460 PER QSI 015. LET CURE FOR 24 HOURS AFTER INSTALLATION AND PRIOR TO PACKAGING.
- 13) INSTALL MS21920-25 CLAMPS WITH D3595-063-430 RUBBER CUSHIONS TO SECURE D2894-1 SUPPORT ON TOP SIDE OF THE CROSSTUBE. ENSURE CLAMPS ARE OPPOSITE CROSSTUBE SUPPORT.
NOTE: MS21920-24 CLAMPS CAN BE USED TO ACCOMMODATE VARYING DIAMETERS. ENSURE THERE IS A MINIMUM OF 1.5 THREADS IN SAFETY ON THE NUTS.
- 14) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE.
- 15) APPLY A THIN COAT OF PROSEAL 890 ON INSIDE CONCAVE SURFACE OF D3190-1 CHAFING SHIELDS AND LET CURE PER MANUFACTURER'S INSTRUCTIONS. INSTALL PROSEALED D3190-1 CHAFING SHIELDS ONTO CROSSTUBE BY APPLYING A THIN COAT OF PROSEAL 890 ONTO CROSSTUBE. BE SURE TO ELIMINATE ANY AIR GAPS.
- 16) INSTALL D3190-1 CHAFING SHIELDS SO THAT OVERLAP IS 50 TO 70 DEGREES FROM BOTTOM OF CROSSTUBE OPPOSITE D2894-1 SUPPORT.
- 17) TORQUE CLAMPS 80 TO 100 IN-LB. TORQUE CLAMPS ON D3190-1 CHAFING SHIELD 40 TO 50 IN-LB. ENSURE AT LEAST 1.5 THREADS ARE SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING. PRIOR TO PACKAGING, RE-CHECK TORQUE ON CLAMPS AFTER ADHESIVE HAS CURED FOR 24 HOURS.

RELEASED

2015 APR 09

97 ECN 15-557

G	INCORP. DEO's D407-667-245-F1/F2 (ZN D8-1, A8-1, D5-2, B6-2, C8-2); 8.90 WAS 8.53 (ZN D5-2); TORQUE REDUCED FOR CHAFING SHIELD (ZN A8-1); FINISH REVISED TO ALLOW MANUFAC. FLEXIBILITY (ZN C8-1)	RF	15.03.20
F	REFORMAT NOTES TO NEW STANDARDS (ZN B8-1); RELOCATED FLAG # 6 (ZN A8-3) PER NCR 210; REMOVED REF. & ADD TOLERANCES (ZN C8-3, C4-3 & D2-3)	RF	08.11.08
E	8.02 AND 8.53 WERE 8.40 AND 8.90 (ZN D5-2); REORGANIZED VIEWS AND REFORMATED DRAWING TO CURRENT STANDARDS. REASONS: CLAMPS MOVED 0.375 TOWARD CL TO ELIMINATE INTERFERENCE WITH AIRCRAFT MOUNTS. REFERENCE: PAR#08-21 AND ECN#1225	MB	08.07.24
D	ADD VIEW FOR OEM SKID HOLES, ROTATE ORIENTATION OF CLAMPS SECTION F.F. REMOVE -851 ABRASION STRIP, ADD MAGNOBOND 6398, ADD CUSHION	PH	07.02.07
C	ADD HOLES AND NUT PLATES FOR COMPATIBILITY WITH BHT/AA SKIDTUBES	PH	05.07.26
B	ADD CHAFING SHIELD	CP	03.05.21
A	NEW ISSUE	CP	02.05.13
REV.	DESCRIPTION	BY	DATE
DESIGN	97		
DRAWN	RF		
CHECKED	97		
MFG. APPR.	97		
APPROVED	97		
DE APPR.	97		
DATE	15.03.20		
DART AEROSPACE LTD HAWKESBURY, ONTARIO, CANADA DRAWING NO. REV. G D407-667-245 SHEET 1 OF 4 TITLE SCALE CROSSTUBE ASS'Y (407 HIGH AFT) NTS COPYRIGHT © 2002 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COPIED OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.			

DQA: _____ Date: _____

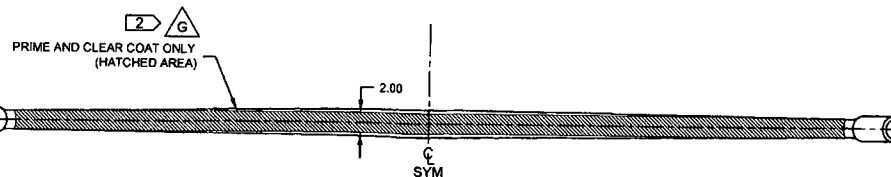
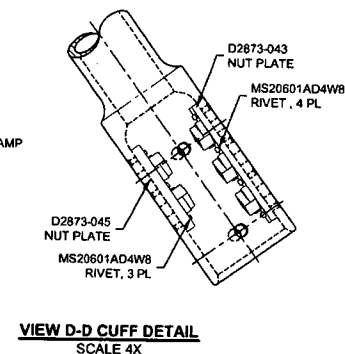
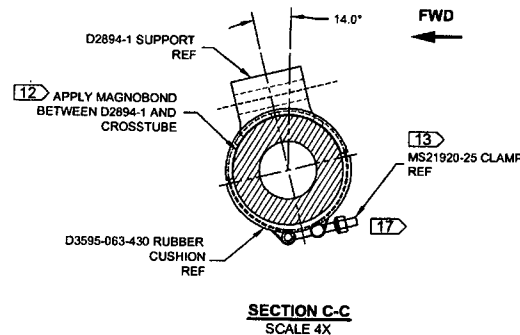
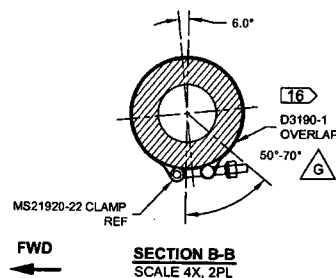
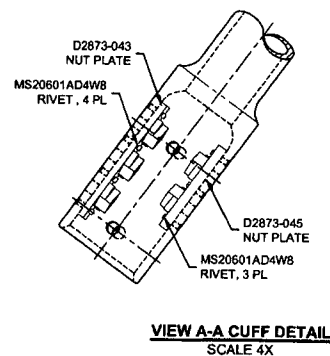
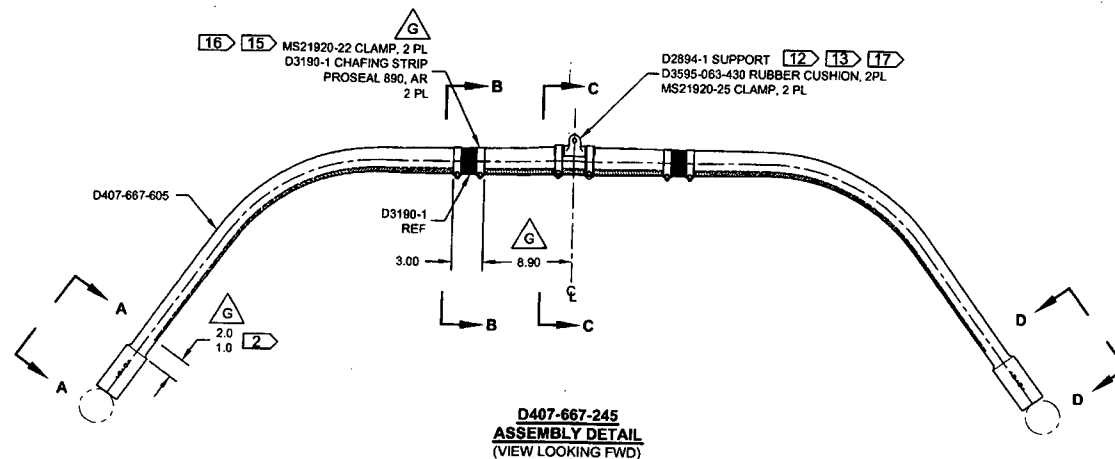


WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐					
Date :		Step #:		QTY Effective :			MRB (QSI042) Approval		
Description Work Order Deviation				Disposition				Completed By	
Root Cause Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☐ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐ No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐		FAULT CATEGORY Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐ Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐ Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Mislabelled ☐ Fit/Function ☐ Misaligned/off center ☐ Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐							
OTHER : ☐									



RELEASED
2015 APR 09

DESIGN	9P	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	9P	DRAWING NO.	REV. G
MFG. APPR.	9P	D407-667-245	SHEET 2 OF 4
APPROVED	9P	TITLE	SCALE
DE APPR.	9P	CROSSTUBE ASS'Y (407 HIGH AFT)	NTS
DATE	15.03.20	COPYRIGHT © 2002 BY DART AEROSPACE LTD	
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DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐					
Date :		Step #:		QTY Effective :			MRB (QSI042) Approval		
Description Work Order Deviation				Disposition				Completed By	
Root Cause				FAULT CATEGORY					
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐				
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐				
Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	Over/Under tolerance ☐				
Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐				
Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐				
Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐				
Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐				
Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐				
LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐				
Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐				
Past Expiry Date ☐	Manufacturing Process ☐	OTHER : _____							
Misidentified ☐	Past Due ☐								

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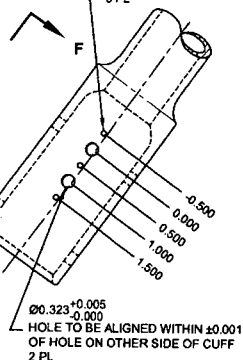
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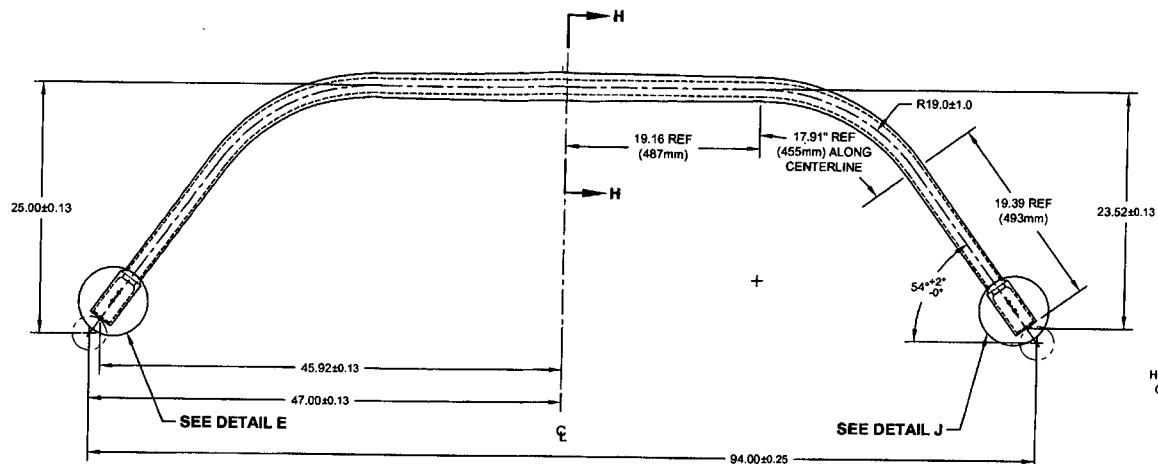
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PILOT Ø0.128
C'SINK Ø0.225X100°
3 PL

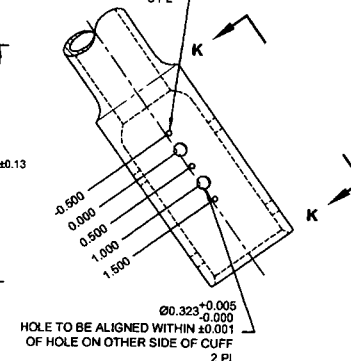


DETAIL E
SCALE 4X
(VIEW LOOKING FWD)

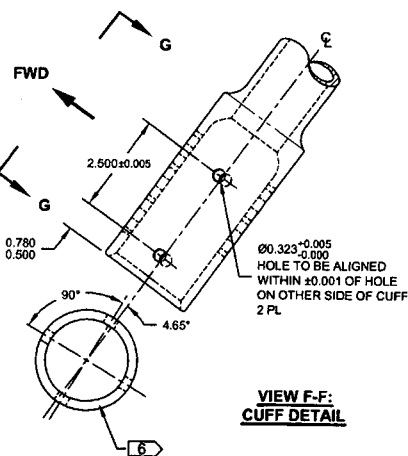


D407-667-605
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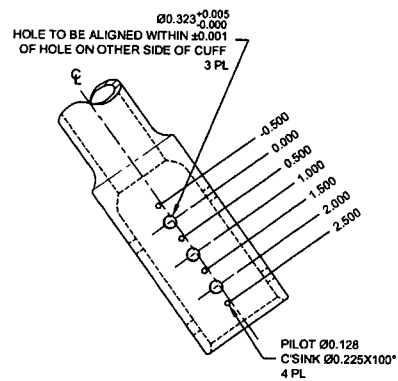
PILOT Ø0.128
C'SINK Ø0.225X100°
3 PL



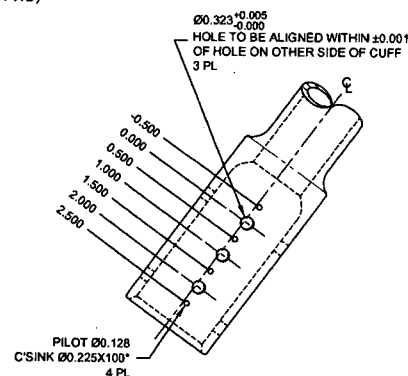
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SCALE 4X
(VIEW LOOKING FWD)



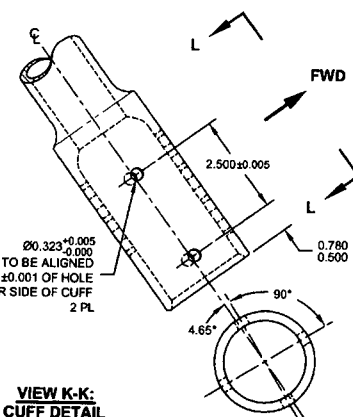
VIEW F-F:
CUFF DETAIL



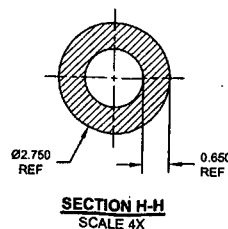
VIEW G-G
(VIEW LOOKING AFT, ROTATED)



VIEW L-L
(VIEW LOOKING AFT, ROTATED)



VIEW K-K:
CUFF DETAIL



SECTION H-H
SCALE 4X

RELEASED

2015 APR 09

DESIGN *q*
DRAWN RF
CHECKED *q*
MFG. APPR. *q*
APPROVED *q*
DE APPR. *q*
DATE 15.03.20

DART AEROSPACE LTD
HAWKESBURY, ONTARIO, CANADA

DRAWING NO.
D407-667-245

REV. G

SHEET 3 OF 4

TITLE SCALE
CROSSTUBE ASSY (407 HIGH AFT) NTS

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DQA: _____ Date: _____



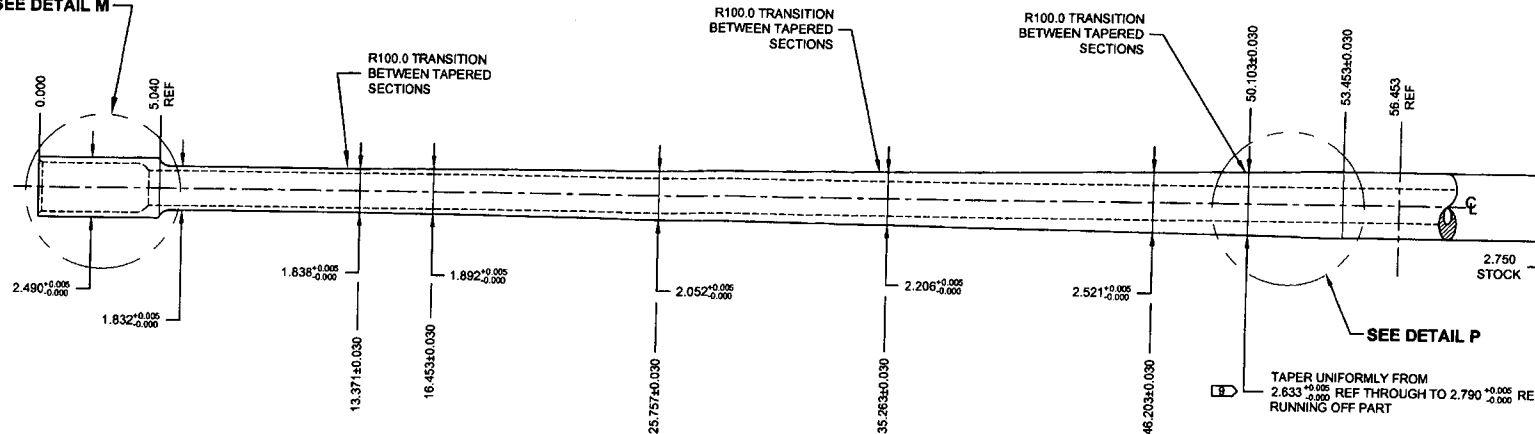
WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

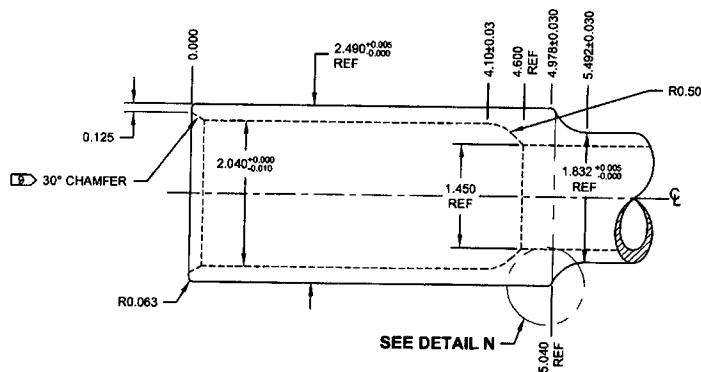
Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS <table style="width:100%; border: none;"> <tr> <td style="border: none;">Skid-tube ☐</td> <td style="border: none;">Cross tube ☐</td> <td style="border: none;">Water Jet ☐</td> <td style="border: none;">Engineering ☐</td> </tr> <tr> <td style="border: none;">Machining ☐</td> <td style="border: none;">Small Fab ☐</td> <td style="border: none;">Prod. Eng. Coord. ☐</td> <td style="border: none;">Quality ☐</td> </tr> <tr> <td style="border: none;">Thermoforming ☐</td> <td style="border: none;">Finishing ☐</td> <td style="border: none;">Rec/Store/Packaging ☐</td> <td style="border: none;">Other ☐</td> </tr> <tr> <td style="border: none;">Large Fab ☐</td> <td style="border: none;">Composite ☐</td> <td style="border: none;">Supplier ☐</td> <td></td> </tr> </table>						Skid-tube ☐	Cross tube ☐	Water Jet ☐	Engineering ☐	Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐	Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐	Large Fab ☐	Composite ☐	Supplier ☐	
Skid-tube ☐	Cross tube ☐	Water Jet ☐	Engineering ☐																						
Machining ☐	Small Fab ☐	Prod. Eng. Coord. ☐	Quality ☐																						
Thermoforming ☐	Finishing ☐	Rec/Store/Packaging ☐	Other ☐																						
Large Fab ☐	Composite ☐	Supplier ☐																							
Date :		Step #:		QTY Effective :			MRB (QSI042) Approval																		
Description Work Order Deviation				Disposition				Completed By																	
Root Cause				FAULT CATEGORY																					
Environment ☐ Design ☐ Doc/Data ☐ Equip/Tooling ☐ Handling/Pre ☐ Material ☐ Internal Transport ☐ Tribal Knowledge ☐ LOA ☐ Substation ☐ Past Expiry Date ☐ Misidentified ☐		No Re-verification ☐ Operator ☐ Offset/Setup ☐ Supplier ☐ Training ☐ Use for Testing ☐ Poor Information ☐ Rushing ☐ Product Improvement ☐ Process Improvement ☐ Manufacturing Process ☐ Past Due ☐		Pressure/Forced ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Wave/Twist in Tube ☐ Marks/Chatter ☐		Temperature/Cure ☐ Set-up ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Inspection Incomplete/Unqualified ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Instructions Incomplete/Unclear ☐ Drill Holes ☐		Power Loss/Surge ☐ Folio/Program ☐ Grain ☐ Weld ☐ Wrong Stock Pulled ☐ Out of Sequence ☐ Off-set ☐ Misabeled ☐ Fit/Function ☐ Misaligned/off center ☐		Positioned Wrong ☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Drawing ☐ Finish ☐ Misread ☐ Turning Sequence ☐															
OTHER : ☐																									

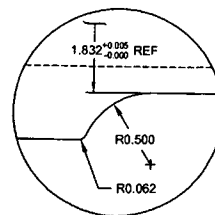
SEE DETAIL M



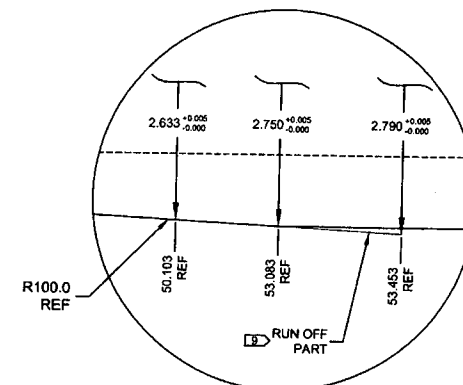
D407-667-245 MACHINING DETAIL



DETAIL M: CROSSTUBE CUFF
SCALE 3X



DETAIL N: CUFF TRANSITION
SCALE 2X



DETAIL P: TAPER RUN-OFF
NOT TO SCALE

RELEASED

2015 APR 09

DESIGN	97	DART AEROSPACE LTD	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	97	DRAWING NO.	REV. G
MFG. APPR.	97	D407-667-245	SHEET 4 OF 4
APPROVED	97	TITLE	SCALE
DE APPR.	97	CROSSTUBE ASSY (407 HIGH AFT)	NTS
DATE	15.03.20	COPYRIGHT © 2002 BY DART AEROSPACE LTD	
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DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____		DISPOSITION Rework ☐ Scrap ☐ Use-as-is ☐ Suspected Unapproved ☐		AGAINST DEPARTMENT/PROCESS Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ Cross tube ☐ Small Fab ☐ Finishing ☐ Composite ☐ Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ Engineering ☐ Quality ☐ Other ☐					
Date :		Step #:		QTY Effective :			MRB (QSI042) Approval		
Description Work Order Deviation				Disposition				Completed By	
								Lead hand / Supervisor Approval Verification	
								QC / QA Coordinator Approval	
Root Cause		FAULT CATEGORY							
Environment ☐	No Re-verification ☐	Pressure/Forced ☐	Temperature/Cure ☐	Power Loss/Surge ☐	Positioned Wrong ☐				
Design ☐	Operator ☐	Bending ☐	Set-up ☐	Folio/Program ☐	Outside Dimensions ☐				
Doc/Data ☐	Offset/Setup ☐	Centre Not Concentric ☐	BOM/Route ☐	Grain ☐	Over/Under tolerance ☐				
Equip/Tooling ☐	Supplier ☐	Cracks ☐	Broken/Damage/Defect ☐	Weld ☐	Part Incorrect ☐				
Handling/Pre ☐	Training ☐	Crimp/Kink/Ripple/Wave ☐	Inspection Incomplete/Unqualified ☐	Wrong Stock Pulled ☐	Part Lost/Missing ☐				
Material ☐	Use for Testing ☐	Cuffs ☐	Contamination ☐	Out of Sequence ☐	Part Moved ☐				
Internal Transport ☐	Poor Information ☐	Crushing ☐	Countersink ☐	Off-set ☐	Drawing ☐				
Tribal Knowledge ☐	Rushing ☐	Heat Treat ☐	Cut Too Short ☐	Mislabeled ☐	Finish ☐				
LOA ☐	Product Improvement ☐	Wave/Twist in Tube ☐	Instructions Incomplete/Unclear ☐	Fit/Function ☐	Misread ☐				
Substation ☐	Process Improvement ☐	Marks/Chatter ☐	Drill Holes ☐	Misaligned/off center ☐	Turning Sequence ☐				
Past Expiry Date ☐	Manufacturing Process ☐	OTHER : _____							
Misidentified ☐	Past Due ☐								

DQA: _____ Date: _____



WORK ORDER NON-CONFORMANCE / UPDATE

QA Closed: _____ Date: _____

Work Order update only ☐

Work Order: _____ Part No. _____ NCR No. _____	DISPOSITION Rework ☐ Scrap ☒ Use-as-is ☐ Suspected Unapproved ☐	<table style="width:100%;"> <tr> <td style="width:15%;"> Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐ </td> <td style="width:15%;"> Crosstube ☒ Small Fab ☐ Finishing ☐ Composite ☐ </td> <td style="width:15%;"> Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐ </td> <td style="width:15%;"> Engineering ☐ Quality ☐ Other ☐ </td> </tr> </table>	Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐	Crosstube ☒ Small Fab ☐ Finishing ☐ Composite ☐	Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐	Engineering ☐ Quality ☐ Other ☐
Skid-tube ☐ Machining ☐ Thermoforming ☐ Large Fab ☐	Crosstube ☒ Small Fab ☐ Finishing ☐ Composite ☐	Water Jet ☐ Prod. Eng. Coord. ☐ Rec/Store/Packaging ☐ Supplier ☐	Engineering ☐ Quality ☐ Other ☐			

Root Cause	Date	Step	Qty	Description of work order update or non-conformance	Initial Chief Eng	Action Description	Sign & Date	Verification	QC Inspector
Design	15.09.23	120	1	XTUBE NARROW PER DIM SHEET.	A.P. 15.09.23	RECOMMEND SCRAP	<i>[Signature]</i> 15/10/09	<i>[Signature]</i> 15-10-09	DAS 9 8-89
Doc/Data									
Equip/Tooling									
Handling/Pre									
Material				P.C. material.		1182.74			15-10-09
Operator									
Offset/Setup									
Process									
Supplier									
Training									
Transport									
Unapproved									

FAULT CATEGORY

Landing Gear ☐ Bending ☐ Centre Not Concentric ☐ Cracks ☐ Crimp/Kink/Ripple/Wave ☐ Cuffs ☐ Crushing ☐ Heat Treat ☐ Inspection Strip in Tube ☐ Marks/Chatter ☐ Turning Sequence ☐ Wave/Twist in Tube	General ☒ Bend ☐ BOM/Route ☐ Broken/Damage/Defect ☐ Burrs ☐ Contamination ☐ Countersink ☐ Cut Too Short ☐ Drawing ☐ Drill Holes ☐ Finish ☐ Fit/Function	☐ Folio/Program ☐ Grain ☐ Hardware ☐ Inspection Incomplete/Unqualified ☐ Instructions Incomplete/Unclear ☐ Misaligned/off center ☐ Mislabeled ☐ Misread ☐ Off-set ☐ Out of Calibration ☐ Out of Sequence
☐ Outside Dimensions ☐ Over/Under tolerance ☐ Part Incorrect ☐ Part Lost/Missing ☐ Part Moved ☐ Positioned Wrong ☐ Power Loss/Surge		
☐ Pressure/Forced ☐ Set-up ☐ Temperature/Cure ☐ Weld ☐ Wrong Stock Pulled ☐ Other		